SPAT - 15 Report

ASSESSMENT

Attachment A: Collection of Responses from Site Survey of Contractor Assessment Programs

Attachment B: Directory of SPAT-15 Participants

Attachment C: Summary of Current Activities/Issues Related to SPAT 15 Task

August 3, 1998

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SPAT-15

ASSESSMENT

EXECUTIVE SUMMARY

In the Spring of 1997, the Department of Energy's Department Standards Committee (DSC) convened a Standards Process Action Team (SPAT-15) to evaluate assessment processes within the DOE complex. If time and resources permitted, the team was also to evaluate assessment processes used by private industry conducting similar work and activities. The specific task statement was as follows:

"Define the attributes of assessment programs that effectively support organizational feedback and improvement of safety systems at all the different levels of contractor and Department organizations."

The team gathered information on existing assessment programs through surveys and presentations by representatives from national laboratories, processing facilities, and remediation sites. Examples of assessment programs described in this report encompass site-wide, individual facility, and task level applications within the DOE complex (see Attachment A). Assessment processes used in private industry were not investigated within the time constraints of SPAT-15.

Early in this process, the team recognized that the term "assessment" meant different things to different people. The level of detail, with respect to work and associated hazards, varied with organizational levels.

The team also recognized that assessment is a long-standing and vital aspect of any successful management system. Whether it is characterized as the "check" part of the proven "Plan, Do, Check, Act" approach, or the "Feedback and Improvement" element of Integrated Safety Management, assessment activities have been performed by successful organizations for many years. For many years these activities have been formally recognized in the Department management system directives "Quality Assurance" (Order 5700.6C , 10 CFR 830.120) and consensus standards such as ASME NQA-1. ISO-9001, ISO-14001, More recently DOE policies on Integrated Safety Management (DOE P 450.4) and Line Management Oversight (DOE P 450.5) have adopted an assessment requirement. Within the DOE complex, these directives and their related consensus standards have become drivers for assessment programs. Although all these documents call for assessment, they do not delineate the elements for conducting effective assessments. SPAT-15 was established to articulate the elements necessary for conducting effective assessments of DOE activities using Departmental experience and these directives and standards in a report to the Department Standards Committee

Elements Necessary for an Effective Assessment Program - The SPAT evaluation identified the following characteristics of effective assessment programs:

- Senior Management must be committed and involved (Section 3.3.3.1).

  Only senior managers can establish and sustain an environment in which quality, productivity and safety can flourish simultaneously. Senior management provides the leadership to integrate assessments into standard business practice, establish a credible independent assessment function, and take aggressive action on all assessment results.

- Roles and responsibilities must be clearly defined for those being assessed and those conducting the assessments (Section 3.3.3.2).

  Line managers and workers must be held responsible for doing work safely, assessing their work performance against the standards and requirements, and for seeking ways to improve and implement safe work practices.

- Performance expectations must be agreed upon before conducting work or assessments (Section 3.3.3.3).

  Achieving supervisor and worker buy-in to performance expectations well in advance of an t assessment increases the probability that improvement opportunities identified will be implemented.

- Workers and supervisors must be involved in and supportive of the assessment process (Section 3.3.3.4).

  Safety and quality is maintained and enhanced by workers and supervisors actively involved with the assessment activities because they have the most intimate knowledge of the work processes and are closest to the hazards.

- Assessment/accident information must be effectively used and communicated (Section 3.3.3.5).

  Assessment information developed by assessors or from external sources should be written in a concise and actionable form with line managers targeted as the intended audience. Assessment information needs to get to line managers who are responsible for measuring risk and have the responsibility and authority to change and improve the safety of their workplace.

- Assessments must be tailored to the organization and hazard level of the work being assessed (Section 3.3.3.6).

  Tailoring individual assessments to those activities being assessed recognizes that there is "no one size fits all" approach to assessment. Likewise each organization must tailor their entire assessment philosophy and program to suit customer expectations, mission, business processes, project life cycles, hazards, and risks. The overall objective of any assessment is continuous improvement, with emphasis on improving the ability to perform work safely while enhancing productivity.

Recommendations for designing and improving assessment programs based on these six elements are discussed in detail in the report.

Recommendations

SPAT-15 recommends that, when the report is final, the Executive Summary plus Section 3.3.3, "Analysis of Assessment Programs" and the attachments to this report be published as a "white paper" providing contractors with comparative information for improving and renewing their assessment program. Implementation of an Integrated Safety Management System will bring with it, at many sites, the challenge of aligning the existing assessment processes to address the Feedback and Improvement safety management function. Information provided in the "white paper" will assist sites in selecting and implementing an assessment program that will determine the effectiveness of the safety management system and help improve the safety program at a basic level, fostering lasting change, enhancing productivity, and meeting regulatory compliance standards.

In a parallel path forward, the SPAT recommends that the information in this report be integrated into "Appendix B" of the Integrated Safety Management System guide. Members of the team are willing to participate in this process, as needed to act as a resource and provide hands-on experience in applying the information in this report.

In recognition that effective use of information for safety improvement remains a challenge at most levels in the DOE/contractor hierarchy, SPAT-15 also recommends a separate, concerted effort at addressing this issue. Easy solutions are not apparent, but analysis of information collected from the sites does provide some insights that might help (see Section 3.3.3.5).

1. Introduction

The Standards Process Action Team (SPAT-15) on assessment was convened in the Spring of 1997 to evaluate assessment processes within the Department of Energy (DOE) complex. If time and resources permitted, the team was also tasked to evaluate assessment processes used by private industry conducting similar work and activities. The specific task statement was as follows:

"Define the attributes of assessment programs that effectively support organizational feedback and improvement of safety systems at all the different levels of contractor and Department organizations."

The specific goals were:

- Analyze assessment programs for their commitment to improvement, and identify the specific attributes of these programs.

- Demonstrate how the attributes provide an effective basis for assessments that drive performance improvement in the context of the five core functions and the seven principles of the Integrated Safety Management System (ISMS).

- Develop a framework for integration and coordination of all DOE (including EH) assessment activities.

- Integrate the output of the Assessment SPAT with existing DOE assessment orders, guidance, and initiatives and with the principles of Integrated Safety Management.

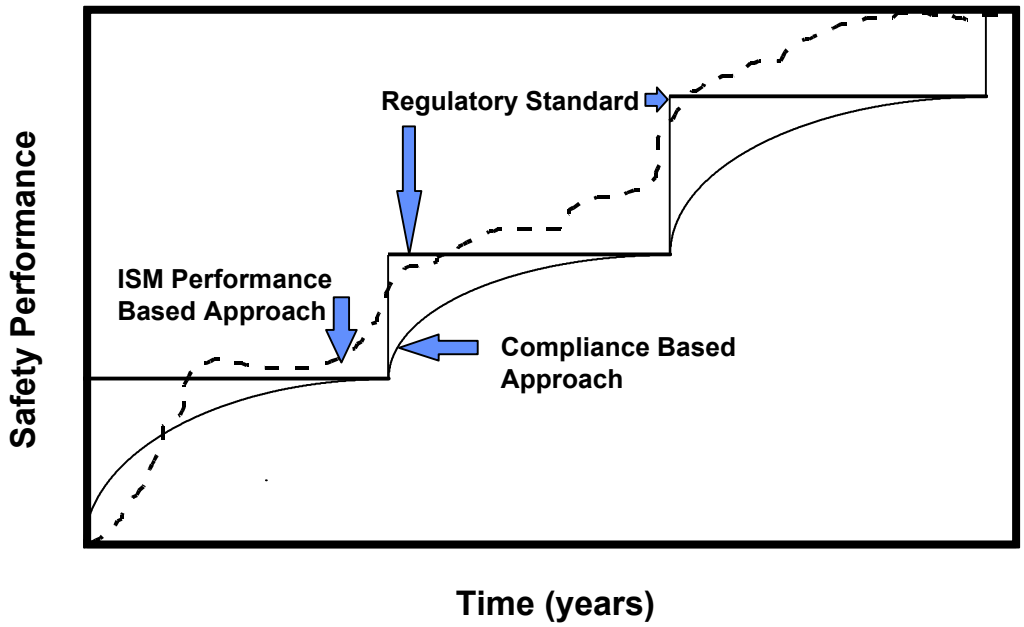
2. Background

2.1 Past Focus on Compliance

Assessments can provide information on strengths and weaknesses of an organization's safety management system, opportunities for improvement, the behavior and attitude associated with safety, and the nature and degree of compliance with requirements. However, assessments focusing primarily on compliance with requirements run the risk of ignoring behavior and the effectiveness of systems and, therefore, may offer little added value to safety and performance improvement. Focusing solely on compliance can limit the assessment benefits to correcting individual deficiencies rather than raising the overall level of safety.

As depicted in Figure 1, assessment based on ISMS could take an organization beyond compliance. The performance goal of assessment based on compliance is shown by the horizontal lines in the graph. Typically, in this situation, when performance approaches the goal, resources and commitment are scaled back, thereby producing an asymptotic approach to baseline compliance. This strategy often fails because the goal (that is, the standards and regulations) and/or the work and hazards change. Either of these changes results in the goal moving above and beyond the safety performance at the time, and a steep increase is needed in pursuit of the new performance standard. This situation is depicted by the solid lines in graph. This approach has been referred to as doing just enough to get by. This attitude can be reflected in the ES & H professionals and the workers at sites operating in this mode. In contrast, safety programs and assessment of those programs based on the seven principles and continuous improvement may not approach the compliance performance goal in the controlled manner depicted by the solid lines (Figure 1, dashed line). A principle-based safety program may take a more tortuous course, but the trend will be steeply upward over time. Its course will not be influenced by the approach to a compliance goal, because the purpose is improvement not getting by. In fact, more often than not in these cases, performance will overshoot the goal.

Figure 1. ASSESSMENT BASED ON INTEGRATED SAFETY MANAGEMENT SYSTEM: IMPACT ON SAFETY PERFORMANCE



Assessment programs can be used to drive safety programs toward principle-based improvement and meet compliance needs at the same time.

2.2 Past impact on work

Various DOE and contractor organizations have separate and distinct responsibilities for work in a facility. Each of these organizations performed individual assessments of the work with little or no integration or coordination. Those responsible for conducting the work of the facility also had to provide administrative, technical, and operational support for these assessments. The resource applied to the assessments did not yield a perceived safety benefit commensurate with the cost of the support provided.

During the past few years, DOE has been redefining and redesigning its assessment activities The new approach recognizes that assessments should drive improvement by developing an understanding of assessment as a link between an organization's planning and conduct of work to bring about meaningful improvement in safety performance... Changes include: (1) Reducing the number of environment, safety, and health assessment requirements in DOE directives (from over 400 to less than 10). (2) Reduce the burden of multiple DOE line management assessments by integrating organizations with similar interests and needs into a single audit. (3) Clarify the objectives of the DOE line management assessment program and its linkage to contractor assessments of their operations, programs and work activities (DOE Policy 450.5). (4) Redirecting DOE assessments to be performance-based (i.e., assessment objectives are aligned with program objectives, performance measures) with a focus on the contractor management system and assessment program. Attachment C summarizes some of these specific activities within DOE.

2.3 SPAT Approach to Assessment

Through review and analysis of existing initiatives and existing programs inside the Department develop the following information:

- Characterize assessment types and oversight activities by their purposes and participants.
- Identify the most significant current barriers to successful assessment programs.
- Examine the attributes of assessment programs by drawing on experience within DOE, being careful to determine whether the attributes are broadly or narrowly applicable.
- List the attributes and identify the types of assessment activities to which they are applicable.

2.4 Expected Outcomes

1. Produce a report on DOE's and private sector's best management practices for assessment of safety programs to:

- Expand DOE's understanding of assessment goals, achievements, and problems and use this knowledge to pursue improvement in safety and worker productivity.

- Provide a clearer definition of the assessment objectives as they pertain to interactions at each level of the DOE and contractor hierarchy.

- Define a set of attributes that can be used by the DOE and its contractors evaluating and improving specific assessment activities.

- Establish a framework for integrating and coordinating all DOE (including EH) assessments (DOE Policy 450.5).

- Provide a basis for achieving fewer unnecessary, redundant, and overlapping assessment activities, thereby fostering the effectiveness of safety programs and the productivity of operations (DOE Policy 450.5).

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2. Develop a set of working models as comparators for

- evaluating and improving assessment activities;

- demonstrating continuing contribution of assessment to lasting improvement;

- providing credible assurance of adequacy of safety programs; and

- reducing barriers to successful and productive assessment.

In summation, this report will recommend options for conducting assessments and disseminating the information, corrective actions, and lessons learned derived as incentives for improvement. We will attempt to detail attributes that contribute to an effective assessment program and provide assurances that the program designed to protect workers, public, and the environment is adequate and effective. If such an assessment is performance-based, it should also provide a basis for assuring compliance, making strategic planning decisions, and continuously improving performance in the pursuit of excellence.

Team members recognize that issuance of this report is just the beginning, providing a baseline for further study and learning.

3. Information Gathering in Support of Approach

3.1 Information Gathering Process

Information for defining the elements related to effective assessment was collected from three unrelated directions.

Information on contractor assessment programs was solicited from each site and field office represented on SPAT-15. The Team developed a format to provide some consistency to the information gathered (Attachment A). Five sites responded with detailed assessment information and two other sites contributed information in presentations to the DSC.

An evaluation of Type B accident investigations was used to provide insights on the utilization of information derived from formal safety evaluations. The rigor imposed on the conduct of formal accident investigations provided a consistent information base for drawing conclusions of collection and dissemination of information from safety evaluations.

The third type of information gathered was derived from the various DOE Performance Indicator programs and contract Performance Objectives, Criteria, and Measures. This information and interviews with those using it in support of assessment processes helped clarify the importance of performance expectations in the assessment process.

3.2 Improving the Role of Assessment in the Feedback and Improvement Function

Reports from individual sites (Attachment A) to SPAT-15 and various presentations from the field to the Department Standards Committee, mainly accident reports, revealed three processes related to assessment that need improvement: ;

These three processes are described below.

Disseminating Information. Information for improving a safety program is available from a number of sources, such as occurrence reports, accident investigations, and a site's own assessment program. However, the pervasive perception of sites surveyed by SPAT 15 is that this information is used with less than full effectiveness. Some sites and field elements make a concerted effort to use such information, some less so; but even in the proactive lessons learned programs the transfer of information is inconsistent. Often a scatter-gun approach is used rather than focusing the information to facilitate application for program improvement. Attempts to relate the information to existing programs or to present it in a manner that would enhance integration into a site's ES&H program are often lacking or not successful. The DSC asked SPAT-15 to examine how effective Type A and B accident investigation (ref. DOE Order O 225.1) results were at bringing about DOE-wide changes to safety management systems. Section 3.3.1 of this report includes findings from the SPAT examination of this topic.

Developing Clear Expectations. Several sites have performance-based contracts containing a set of ES&H performance measures. In addition, several programs within DOE require safety data reporting as performance indicators. Before the SPAT could address the role of performance expectations, the type of information gathered by the various performance indicator programs and its intended audience had to be identified. This clarification assisted in defining the importance of performance expectations in the assessment process.

Mechanisms for Enhancing Behavior and Attitudinal Change. This report explores the characteristics of assessment programs that enhance lasting improvements in safety. Characteristics include worker and supervisor direct involvement in assessment processes, incentives for improvement, and clear expectations based on safety principles rather than solely on rote compliance.

3.3 Evaluation of Information Gathered

3.3.1 Analysis of Accident Investigations

The Department has in place a rigorous accident investigation process (ref. DOE Order O 225.1) that is conducted with a high degree of integrity and produces extensive administrative and technical information on the event. The DSC requested SPAT 15 to examine what affect an accident investigation report has on organization that was not associated with the accident. The DSC had concerns over the effectiveness of the accident investigation report at driving changes in the safety management systems across the Department. The DSC also was interested in learning how the report is used in an organizations assessment program.

Two "Type A" accident reports were used to gather information requested by the DSC from two sites not associated with the events: 1) a fatality resulting from a craftsman's anti-contamination clothing catching fire; and 2) a near electrocution resulting from a craftsman cutting through a buried energized cable. The following questions were discussed with ES&H managers at the two sites. The responses identified the potential to improve certain aspects of our ability to use the accident investigation process information in safety management systems.

> *Impact of Accident Investigation Reports on Assessments* - Both sites make use of available accident investigation lessons learned in their assessment planning , quality improvement, and corrective action processes. The reports may not trigger an assessment solely on the issues surrounding the accident.

> *Accident Investigations as Drivers for Improvement* - Clear expectations for the use of the accident report information are not uniformly communicated to contractors who had no involvement with the event. Specifically, the need for evaluation of the potential impacts, identification of preventive and corrective

actions, and follow up are not seen as required actions. This is further complicated by the availability of accident reports. The reports are not systematically transmitted to the contractors through their DOE field element. Type A Accident Reports are available electronically through the internet. One site uses the occurrence reporting system to locate Type B reports and then must request the report from the affected site contractor.

Effectiveness of the Accident Investigation System at Preventing Similar Events - Using only the feedback obtained from two sites, it appears DOE has mixed success with prevention of accidents similar to those investigated. Occurrence reports continue to relay incidents involving accidental breaches of energized systems. The case involving the anti-contamination clothing fire has received greater attention and wider response. For example, DOE directives were revised , other sites evaluated their fire safety controls and flammability of protective clothing, a video relaying the personal impact of the accident was produced a shared through out the DOE complex, and site personnel conducted briefings for other sites.

SPAT 15 found that certain changes to accident investigation system and processes would enhance its contribution to the Feedback and Improvement function.

- Provide easier access to Type B accident investigation reports;
- Establish clear DOE expectations for evaluation and corrective/preventive actions beyond the location of the event, and uniformly communicate them to all contractors;
- Define lessons learned and judgments of need in the reports for DOE-wide application;
- Require formal corrective/preventive action tracking of DOE-wide lessons learned; and,
- Require formal reporting of Type A accidents to the Secretary of Energy and an executive summary of the status of corrective actions.

3.3.2 Analysis of Performance Indicators and Performance Objectives, Criteria, and Measures

Performance objectives, criteria, and measures (performance measures) set expectations for performance. Performance is assessed against these criteria and measures using formally established gradients that are part of performance measures. All DOE contracts base the ES&H clause firmly on the seven principles and five core functions of the

Integrated Safety Management System. Therefore, it is not surprising that at many sites the performance measures established to demonstrate that the specifications of this clause are being met are also based on the same principles and core functions. In some cases, expectations for each tier of the contractor organization are also based on this same framework. The detail increases as one drills down into the organization to the level where the actual work is performed. Examples of this approach are provided by LLNL's assessment criteria (Figure 2) and by the Berkeley Lab's use of the ISMS principles as contract performance measures, as well as for workplace assessments. In the latter case, the contract measures probe the effectiveness of the safety programs, whereas the workplace assessment criteria delve into work activities, associated hazards, and their control or mitigation.

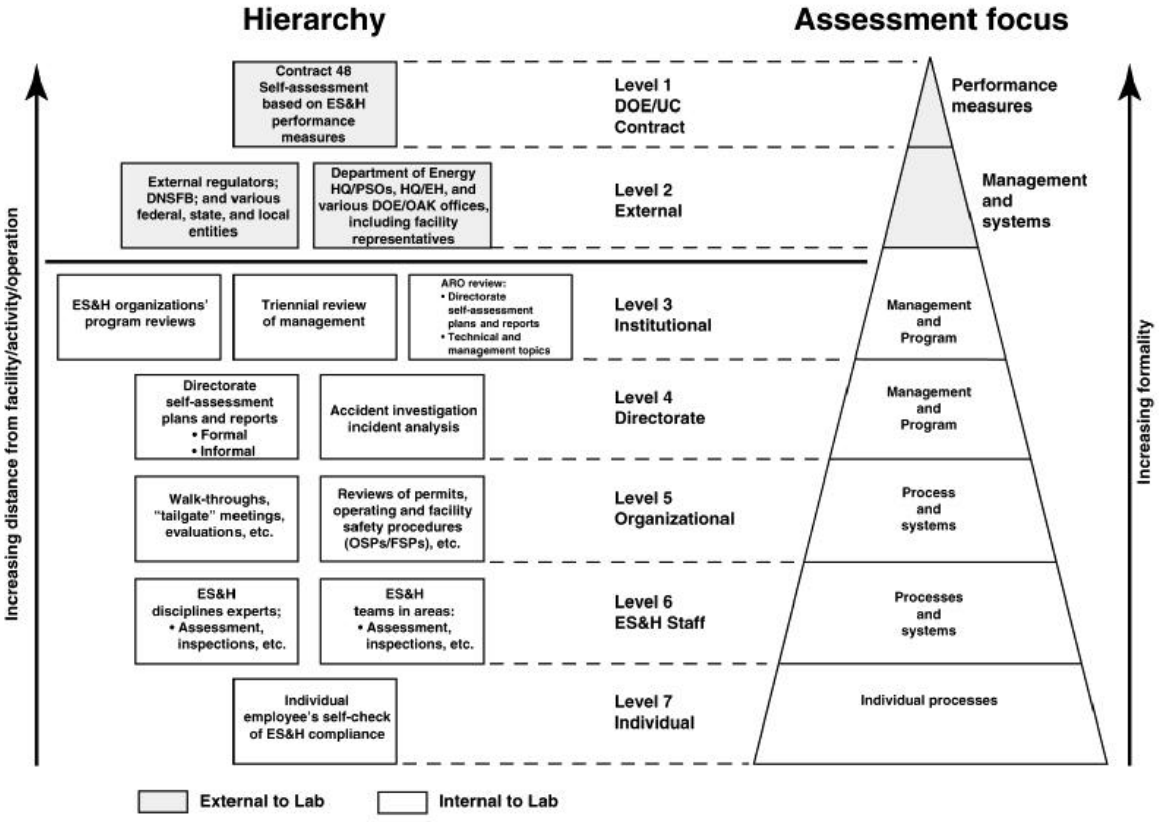


Figure 2. ES&H assessment hierarchy and focus.

Clearly, using a framework of accepted reference points, such as the principles of ISM, is crucial to the effective application of performance measures. In the words of John Wreathall, "Measures need to be built around some model of safety; otherwise all you have are buckets of data." Examples of using an ISM-based approach are available from several sites. As a demonstration of the diversity possible under such an approach, the

three National Laboratories managed by the University of California have different process measures as appendices to the University of California/DOE Contract, but all are based on ISMS principles and core functions.

Performance indicators are safety metrics selected as indicators of how well a safety program and/or process is meeting safety and/or compliance expectations. The definition is based on the assumption, which should be verified prior to establishing performance indicators, that activities being tracked in the safety program are clearly linked to the indicators. Risk managers and assessors should remember that performance indicators are but one of many signs of how well performance expectations are being met. Other indicators include evaluations based on operational awareness, the contractors' self reported evaluation based on formal assessments, and reports from the line manager's walk arounds.

Caution is necessary to those who would use any of the current sets of performance indicators as benchmarks. The indicators from the various sites and from private industry include different types of work with very different risks, different bases for normalization, or different potential for exposure. For example, injury frequency and severity data for engineers at one site might include all engineers; the indicator would include those doing activities in the shops and in the field with relatively high probability for injuries, along with those in research and development activities where the risk is demonstrably lower. At another site, the injury reports might include only those engineers in the higher-risk positions. Simply based on reported injury and occupational illness data, the first site would have a better record than the second if all other aspects of the safety program were equivalent; e.g., processes, attitudes, and skills and knowledge of staff. If trends are used, rather than absolute values of the indicators, it is accurate to compare between sites in the sense that a site with a downward trend (for example, in the number and severity of chemical exposures) is likely a better benchmark for improvement than one with an increasing trend. However, even in this case there are caveats. For example, if the site with the upward trend has an extremely and consistently low record of chemical exposures, an upward trend over a rather short reporting period might be within the statistically expected variation. Therefore, this site might provide the better option as a benchmark for improvement.

Two points can be made. First, indicators are just that. They should be used judiciously and with careful analysis in conjunction with other information before making safety management decisions based on such data. Secondly, DOE should make a concerted effort to minimize the differences in the reporting bases or indicators if their use is for comparisons within the complex. The task of having comparable data is even more complex if DOE wants to compare with private industry. Such a commitment would mean developing agreements with the industrial complex on data expression. If ,on the other hand, the intent is to use the indicators to evaluate the progress toward safety improvements at a single site or in a specific facility within a site, then the DOE needs to make that limitation very clear. The use of performance-indicator data for inter-site comparisons is very tempting when the data is so readily available.

Table 1. Performance Indicators

Summation of the topics gathered under three of Department of Energy s performance indicator programs. The second column labeled Secretary s Critical Few are the indicators gathered from the sites in behalf of the Secretary of Energy s need to know the performance status of DOE contractors in crucial areas of interest. The indicators gathered by Environment, Safety, and Health (EH) are ES&H indicators commonly used in government and agencies industry as reflecting performance in protecting workers, the public, and the environment. EH uses these as part of their process for selecting sites needing help in implementing their safety programs. The set of collected by Energy Research (ER) from their contractors is a variation on the EH set.

Performance Indicator	Secretary s Critical Few	EH s ES&H Indicators	ER s ES&H Indicators
Customer Satisfaction	**X**		
No. of Employees	**X**		
Diversity Utilization	**X**		
Major Commit. Cost Savings	**X**		
OSHA Cost Index		**X**	
Env. Releases/Violations	**X**	**X**	**X**
Lost Workday Case Rate	**X**	**X**	**X**
Lost Workdays			**X**
Total Recordable Injuries			**X**
Radiation Dose, Worker		**X**	**X**
Radiation Dose, Public			**X**
Radiation Events		**X**	**X**
Occurrence Reports			**X**
Safety Record		**X**	
Electrical			
Pkg. & Transportation			
Industrial Operations			
Chemical			
Precursors & Near Misses		**X**	
Hazard Level		**X**	

3.3.3 Analysis of Assessment Programs

Implicit in the information from the site surveys is the importance of the assessment process in maintaining a safe workplace. All of the sites committed considerable portions of their safety resources to assessments of various types. Several sites offered the comment that to be effective, safety programs in general, and assessment programs in particular, must be supported by all levels of management.

3.3.3.1 Senior Management Commitment and Involvement

Successful senior managers establish high standards and expectations for assessments and for the use of assessment results to effect continuous improvement and demonstrate conformance with expectations. Informed, involved managers ensure that responses to assessments are provided to support their programs and are used to remove barriers. Their involvement demonstrates a commitment and establishes a culture in which workers willingly participate in assessments. The best designed safety program in the world will not have an impact on workplace safety without management's commitment. The maximal involvement of workers and first line supervisors in recommending safety improvements is fruitless and frustrating in the absence of a commitment of time and resources for evaluation and implementation.

The actions and deeds that help give credence to such a commitment include frequent workplace safety walk arounds by managers, attendance by mid- and upper-level managers at safety meetings, and a human resource management policy stating that safety performance be included in employee annual expectations and evaluations. One site has made management's commitment to safety clear through its policy and action by making participation in the assessment and safety programs a factor in career development. This use of an incentive for commitment to safety, rather than sole reliance in enforcement, reinforces the positive results of direct worker and supervisor involvement in safety and assessment activities. Gains in worker trust and confidence result because workers know that management takes safety issues seriously and expects workers to make the same commitment. A positive attitude toward work correlates with fewer errors in judgment and fewer accidents. An effective assessment program also benefits the senior manager with an increased knowledge and confidence in the organization's ability to safely deliver on customer expectations.

3.3.3.2 Clearly Defined Roles and Responsibilities

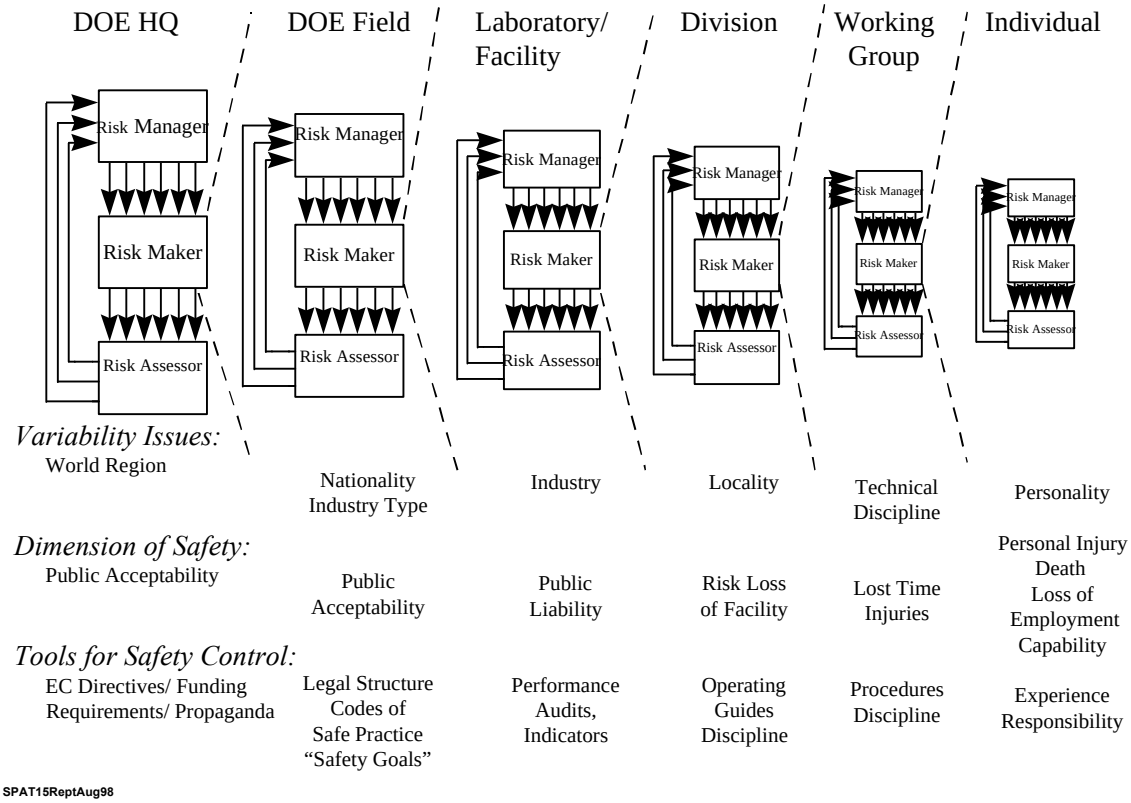
Concept of Corporate Tiers - At the first meeting of the SPAT, it was agreed that evaluating existing relationships as a corporate hierarchy would help to clarify assessment roles and responsibilities. This approach resulted in a consensus that assessments would span all the tiers, from the working level in a contractor's program to the field elements of DOE to DOE Headquarters. The DOE/contractor hierarchy is depicted schematically in Figure 3 . This adaptation from Dr. Wreathall's representation of corporate assessment

responsibilities clearly illustrates that the complexity of this hierarchy is two dimensional. First, the tiers within a contractor organization begin with the individual worker, then sequentially include a group of workers plus a supervisor, a project encompassing more than one working group, an organizational division or department that includes more than one project, and finally the site itself made up of several organizational entities. DOE Field elements and Headquarters adds tiers above those of the contractor. Another concept important to this model is that the risk maker, risk assessor, and risk manager at the lower tier become the risk maker to the next higher tier in the hierarchy. The relationship between the field elements and a given site may provide the clearest example of this concept. The site, as a whole, is the risk maker for the safety and programmatic managers in the field office. DOE field elements and all of the many tiers within the site, including the risk assessment program are considered the risk maker by DOE Headquarters

The other dimension to be considered is across each tier. An understanding of roles and responsibilities in the assessment process is facilitated by discussing each of them in terms of a risk maker, a risk manager, and a risk assessor at each tier in the DOE/contractor corporate hierarchy. Starting with the work, these tiers within a typical contractor's organization include the individual worker, a group of workers, a facility, and the a site. The next tier up is the level of DOE most intimately connected to contractor operations, the site office, followed by the field elements, and headquarters. At the work activity-level, the role of the risk maker, manager, and assessor is the responsibility of the individual worker. At the facility level, the risk managers are those accountable for the day-to-day evaluation of workplace safe practices; the risk makers are the workers and their immediate supervisors; and the risk assessors are those who use a formal process to objectively conduct assessments. At the site or corporate level, these three roles become split among distinct organizations of the management staff. The risk assessment becomes more formal and more objective and, thereby, provides detailed information on the success of risk managers, including workers and line managers, in maintaining a safe workplace. A goal of the more formal and objective assessments is to evaluate how well workers and line managers are meeting their responsibilities. Primary among these responsibilities are identifying and controlling hazards, working within authorizations, balancing priorities, ensuring that staff are trained commensurate with the work performed, and fostering feedback and suggestions for improvement. These formal assessments also validate the effectiveness of the day-to-day safety evaluation

An individual worker is readily seen as a risk maker. At the same time, this individual is expected to be responsible for managing his/her actions and equipment in a manner that reduces the chance for accidents. In this sense, workers are clearly risk managers . These workers should also be risk assessors. Before commencing a given task, say drilling a widget, workers are expected to assess the safety situation; for example, their skill in performing this task safely, the impact of that work on the safety of others and the environment, and the appropriate action necessary to mitigate untoward consequences.

Figure 3. The Telescope of Safety Control



Risk management - The Integrated Safety Management System Policy (DOE P 450.4) and the Line Management Oversight Policy (DOE P 450.5), clearly identify line management as responsible and accountable for safety in their programmatic areas. From the working group upward through an organization, the role of line managers is that of risk managers; that is, to ensure that hazards are understood, safety controls are in place, and the controls are adhered to on a continuous basis. Because this responsibility is continuous and ongoing, assessment responsibility rests primarily in line mangers and their workers. These activities include line management oversight, periodic safety walk arounds, job observation programs, and behavior based safety training. The expected outcomes from such activities include maintaining good safety practices, immediately correcting unsafe or potentially unsafe work practices, and providing an informed basis for assurance to risk managers at a higher level that operations are safe. The risk manager must use information from the risk assessors to perform their function fully and successfully.

The framework of the hierarchy also clearly demonstrates that line management responsibility exists throughout the corporate structure, including not only all levels of management within the contractor's organization, but extending up through the programs at the field level to the programs in Headquarters. This concept makes clear that a multi-

program site has risk management responsibilities for each of those programs, emphasizing the importance of a site's assessment program. If the site has a robust, validated, and open assessment program, then DOE's multi-program needs could largely be met through the contractor assessment program and operational awareness. On the other hand, if a site has a weak or superficial assessment program, the site could be justifiably subjected to safety evaluation by representatives of each of the DOE programs, if they are to meet the ISMS principle of line management accountability.

DOE line management oversight has been achieved in the past as part of the formal appraisal process. To meet the Department's need for timely unfiltered safety information, many DOE field elements are implementing "operational awareness" in an attempt by the contractor to make the DOE programs continuously aware of work activities, associated hazards, and the effectiveness of hazard controls. Operational awareness activities include immediate information sharing, attendance of DOE staff at site safety meetings, and inclusion of DOE staff as observers in technical appraisals and in validation of performance under DOE contracts.

Risk assessment is addressed by a formal assessment process. At all contractor sites examined, contractors have an independent group that coordinates objective assessments and then disseminates the information derived from the evaluations. These formal assessments are periodic and led by individuals independent of the risk makers and managers so that an objective view is retained. Activities in this category are more formal than line management walk arounds, as they are an in-depth evaluation of the safety systems and programs by safety professionals, managers, and workers selected for their knowledge of the work and their ability to assess objectively the work, the associated hazards, and the effectiveness of the controls. Peers from related projects are often added to the assessment teams. Peer involvement may reduce the degree of independence of the team. Any loss of independence is more than compensated by involving experienced personnel who are familiar with the organization and facility. Peer involvement adds value through increased credibility and technical legitimacy of the team's evaluation, enhanced acceptance of improvements by the risk maker, increased trust and confidence in the safety program at the working level, and increased probability of successful implementation of improvement. Expected outcomes include immediate corrections for individual findings, but more importantly, an evaluation of the overall safety program with the aim of bringing about lasting improvements.

Within DOE the Secretary has assigned responsibility for independent assessment of environment, safety, health and safeguards and security to the Assistant Secretary for Environment, Safety, and Health (EH). The Office of Oversight (EH-2) performs this assessment function for all aspects of safety. Nuclear safety regulation enforcement under the Price Anderson Act Amendment is performed by the Office of Enforcement and Investigation (EH-10). This responsibility extends from the work at the site or facility through the contractor, DOE field office, and up to headquarters Program Office that sponsors and supports the work activities.

The site survey revealed opportunities of improving and strengthening all types a assessments. (1) Analysis of various assessment and appraisal criteria disclosed that evaluation of the assessment process itself is rarely included in assessments. It is recommended that each tier, both as risk managers and risk assessors, evaluate the assessment processes for improving safety in the tier below. (2) Data collection too often relies on checklists and inspection rather than including interviews, observation of work practices, and suggestions. In addition, the traditional inspections should be conducting while work is in progress. (3) Assessment emphasis needs to change if we are to alter the commonly held perception by workers and their immediate supervisors that assessments, of either type, are invariably punitive. Punishment is best limited to those situations in which an individual, group, or corporation that knowingly and willingly subvert safety controls or where criminal actions occur. An effort to make assessments of value is essential to success. Overzealous emphasis on compliance in workplace assessments can stifle the collection of information crucial to a comprehensive assessment. Credit should given for self identification and revelation of strengths and weaknesses. Corrective actions should be congruent with the goal of improving safety and productivity, not of embarrassing the worker, a facility, or a site.

3.3.3.3 Expectations

Expectations for effective safety performance are essential if an evaluation is to result in program improvement. The expectations must be understood clearly by all parties before commencing work and well in advance of assessing safety performance. Agreement on safety expectations will contribute to a more effective assessment process. Agreements should be based on an informed, objective evaluation of the work, the associated hazards, and the most appropriate means to mitigate or eliminate those hazards.

A common practice is to express assessment expectations as performance objectives, criteria, and measures in the contract between DOE and its contractor. At most sites, expectations for the organization are based on the principles and core functions of ISMS, as stated in the DOE contract. Expectations act as goals to the safety program managers and a clear basis for assessing the success at achieving these goals. Risk managers operating in the absence of clear expectations will find it difficult to adhere to ISM principles, e.g., to balance priorities, to hold line managers accountable, and to tailor controls to risks and hazards. The same point can be made for risk assessors. Assessors use expectations to measure performance fairly and objectively. It is becoming common for sites to use these same principles and functions for assessing the effectiveness of their safety programs. Basing the assessment criteria on the seven ISMS principles helps to tailor the detail and rigor of an assessment to the hazards and complexity of the work and activities. The principles are used to set expectations well in advance of conducting work and the accompanying assessments.

3.3.3.4 Worker and Supervisor Involvement

Analysis of the SPAT 15 survey results indicates that worker and supervisor involvement and active participation in day-to-day assessment activities are common in those organizations that effectively use assessment results to make safety management decisions. Worker and supervisor involvement is essential when assessing the safety and quality of their work processes. Safety is maintained and enhanced by workers and supervisors actively involved with the assessment activities because they have the most intimate knowledge of the work processes and are closest to its hazards. This knowledge increases the effectiveness of the assessments in determining improvements. Worker and supervisor involvement in ongoing safety overviews allows those who best know the work and hazards to help find ways to work safely. Such involvement also enhances acceptance of changes and improvements while inducing a sense of pride in bringing about such improvements. It may be impossible to quantify the increased cost effectiveness of this involvement. However, those who know the work best and fully understand the consequences of breaches in safety controls are more likely, given the opportunity and motivation, to develop effective ways of mitigating hazards, allowing for work to be accomplished safely. This "inside" information is difficult for outside participants to gather and/or put in the context of effective work controls and authorizations. Accepting and implementing employee suggestions for improvement often provide sufficient incentives for many employees to maintain their commitment to the safety program. Workers and supervisors must understand the need for one another in the assessment process. Both have a part to play. An assessment program that involves only one will not succeed. Both the worker and the supervisor must be sufficiently engaged in the assessment process so that trust in one another can grow. The value of working safely and participating in assessment activities should be stated in terms that enhance this participation. Management recognition of the value of on going worker and front line manager participation in assessment activities should be re-enforced by including this behavior in the annual performance appraisal and by rewarding those who demonstrate effective participation.

Involving of workers and supervisors in formal, independent assessments should also be encouraged. Of course, in these situations care must be taken to ensure that workers are trained and that conflicts of interest do not exist, e.g., workers who are tempted to protect fellow workers or the work activity from assessment findings. ESH/QA professionals who team with workers and supervisors will further enhance the usefulness of assessments by identifying additional hazards and controls. Joint teams composed of workers and safety professionals have the added advantage of giving workers the opportunity to participate and get credit for safe work. The contact with ESH/QA professionals gives workers on-the-job assessment training. The worker will increase his/her level of technical knowledge his safety awareness and, thereby become a more effective participant in workplace safety management on a continuous and ongoing basis. In return, the safety professionals receive on-the-job training from the workers on the

nature of the work activities and associated hazards. Management's expectation that workers and their supervisors be actively involved in workplace safety demonstrates that

both have a mechanism for influencing management decisions for performing work safely and that management endorses this activity.

3.3.3.5 Effective Communication and Use of Information

Communication of assessment information should be tailored to meet the needs of each corporate level. Although the purpose of risk management and risk assessment is the same at each tier, namely to do work safely, the type of information, the level of detail, and the consequences expected from corrective actions are very different. Figure 2 illustrates how one site has developed its assessment program in response to these different needs. Understanding this concept underpins the recommendation to target information to the line managers at the appropriate level in the organization. A senior manager and a project manager both need information from a given assessment, but the focus and emphasis of the information needs to be distinctly different for each to understand the applicability of the lessons learned to his/her operations and activities. Their differing outlooks, responsibilities, and priorities may necessitate a different interpretation of the results for each of them to efficiently discharge their management duties.

Dissemination of assessment information appears to be a weak point in many organizations . The common practice is to limit feedback for improvement to the entity being assessed and their risk managers. An example was presented earlier in this report in the discussion of information derived from accident investigations. Reports from various sites indicate that formal contractor assessments often implement corrections thoroughly in the unit being assessed., Application of the findings to similar work situations in other units is not as successful in generating improvements. For dissimilar work situations, it is even more likely that the potential for applying the assessment information in a preventative manner will be overlooked. In these situations, improvement is limited to a single working unit in a single tier of the corporate risk-management hierarchy. In the same way, many sites lack processes for gathering accident information from other sites or private industry in support of a lessons learned program. Awareness helps to correct problems, and awareness of the importance of a vigorous lessons learned program has certainly increased in recent years. Some DOE sites have lessons learned working models worthy of consideration.

All the models provide methods for disseminating recommendations for improvement beyond the unit being assessed. In the first model, feedback is given to the assessed group and to working groups with activities, working conditions, and/or hazards comparable to those of the unit assessed. The second model provides for an evaluation of the assessment information for its applicability to improving safety management at all levels and throughout all work activities and operations within the organization. The third model, which is the most comprehensive, collects assessment data from all sources (workplace assessments, line management walkabouts, technical assessments, and management assessments) and melds the data into comprehensive reports for the benefit

of the assessed group, for comparable groups in the organization, and for other levels in the corporate structure.

All three models increase the usefulness and effectiveness of assessment information. The first two provide timely feedback for immediate improvement. The third is less timely, because the wider scope of information sources takes additional time for evaluation. Nonetheless, providing in-depth, comprehensive assessment feedback annually basis is of value in bringing about basic improvements in a safety program.

Under any circumstances, assessment information should be targeted and written with line managers as the intended audience. Line managers are responsible for measuring risk and have the responsibility and authority to change and improve the safety of their workplace. To have an impact, assessment information must get to these managers concisely and in a form that induces action. Integration of assessment information to improve work activities can also be enhanced by targeting the information to specific work activities and by providing guidance that enhances lasting improvements. Several sites are using multifunctional teams made up of ES & H/QA professionals, workers and their supervisors, and senior managers to analyze and disseminate information for safety improvements. This approach enhances communication of immediately understandable, applicable, and useful data to line managers.

Clearly, the availability of improvement information is important, but the quality of the information is also a factor. Many of the assessment programs evaluated have instituted review committees to evaluate assessment results and then participate in preparing the report with recommendations for improvement. Committee membership includes workers, supervisors, mid-level managers, and senior managers, in addition to subject matter experts in QA and ES&H. The committee is charged with investigating assessment results, identifying the underlying problems, conducting a causal analysis, and developing corrective actions that provide a systemic solution (see the SRS report as an example, Attachment A). Previously, it was common practice for a QA or an assessment management group to prepare such reports. However, a committee's input is much like having workers and supervisors involved in the assessment process: worker and supervisor participation ensures that the improvement recommendations are practicable and applicable to the work and associated hazards; senior managers provide valuable guidance for balancing priorities; and the subject matter experts ensure that the improvements have a sound technical and regulatory basis. Such a process results in information that line managers can understand and that evoke action.

In support of lessons learned and organizational improvement, the objective of an assessment evaluation is to be watchful for activities and attitudes that could lead to unsafe practices and, where such evidence exists, to implement changes in the safety program that will have a lasting and pervasive corrective effect. The information derived from this process should be presented with the audience in mind; for example, corrective improvements presented to management might have a quite different format with different supporting material than when presented to workers on the floor. Another reason to

ensure that lessons learned information reaches line management, both at the field and contractor level, is that line managers are more likely to recognize the importance of the problem, to distribute the information appropriately, and to authorize and implement improvements. Some sites reported that the lessons learned were processed through the training group or the QA group. Both of these practices can be defended, as both groups have responsibilities in responding to and tracking corrective actions, but the information must be dispersed as well to those directly accountable for maintaining and improving the safety program: programmatic line managers.

Another SPAT 15 survey finding indicated that field offices and contractors are often inundated with incident information, with an expectation of some action. This practice of transmitting massive amounts of data, with little focus or consideration for the diversity of the audience, and perhaps with little or no relationship to activities at a given site, can lead to information overload. Furthermore, much of the data are presented and analyzed for safety professionals, not line managers. Consequently, conscientious contractor line managers in the field (DOE and contractor) are likely to respond to all of these transmissions with some sort of action, overloading the ES&H program and making it even less effective. Another unwanted outcome is for the information being ignored, thereby having little positive effect on safety programs. The DOE lessons learned programs with a positive impact are those that target incident findings and corrective improvements with responsible line managers in mind.

Effective communication and use of assessment/accident investigation information is a significant challenge throughout the DOE complex. Easy solutions are not apparent, but analysis of information collected from the sites does provide some insights that might help. Effective use of safety improvement information remains a challenge at most levels in the DOE/contractor hierarchy; and a separate, concerted effort at addressing this issue is one of this report's recommendations.

3.3.3.6 Tailoring Assessments

Each site responding to SPAT 15 reported using several types of assessments, as many as six, to obtain sufficient and comprehensive information at all levels in the organization and to be assured of the status of the safety management program and areas for improvement. Variations exist among the sites with regard to the name of the assessment, and the primary entity responsible for various types of assessments. The reports do indicate agreement on the types and scope of their assessments. For example, workplace assessments, both day-to-day and formal, provide comprehensive detail but may lack technical analysis. This technical aspect is the focus of the functional or *ad hoc* assessments, which target high risk activities or groups with safety records below the corporate benchmark. Management assessments are designed to probe the effectiveness of an organizational unit at managing its safety challenges. The designations of the remaining types, e.g., DOE Annual Appraisal and Contract Performance Assessment, make their purpose clear. No site responding to the survey depended on one type of

assessment to provide a basis for ensuring that work is being performed safely. The Assessment Team recommends this multifaceted approach to all contractors.

Assessments described in the responses to the Team's survey can be classified on the basis of the primary organizational level targeted (see Wreathall Telescope, Figure 3), the purpose and scope, and the expected outcomes (Attachment A). Beginning at the workplace, the first category is individual workers' self assessment.

Individual. Assessment at this level takes the form of survey/suggestion programs, self check/inspection processes, peer behavior based programs.

Behavior based training and job observation are likely the best examples of individual assessment. Several sites have implemented programs of this type among craft workers and workers in processing facilities. These programs are characterized by involving all workers in a given work activity; training workers to observe each other at work and to encourage peers to participate in safety improvements. Representatives from each group are often used as a steering committee to coordinate training of other peers as trainers, monitor the program, and expand its application to other groups. Often the workers in such programs will discover improvements that go beyond alterations in behavior and workplace practices, improvements appropriate for action by the steering committee. Facilities with mature behavior based safety programs note that observing each other at work results in a workforce that appreciates the value of its work and of doing it safely. For management, it produces a workplace where external audits are routine. Typically, total recordable injury rates decrease in the months following implementation of a job observation program.

A few sites included individual commitment to safety as part of their workplace assessment program. Examples of this approach are the Self-Checks at Hanford and the Savannah River Site (SRS). Staff are coached to take the time before initiating a hazardous task to ensure that hazard controls are in place, all possible consequences have been addressed, and that coworkers are not conducting activities that might adversely impact the safety controls. Other sites reported similar programs, particularly in high hazard processing operations.

One site distributes employee surveys to gather information for use by senior management in balancing priorities. These questionnaires have been prepared by outside consultants to provide an independent probe of staff views on ES&H and suggestions for improvement. Another set of questionnaires was distributed in conjunction with an Integrated Safety Management assessment. This survey's goal was to determine specifically how well the five core functions of ISM were being met in the workplace. One questionnaire was completed by supervisors after discussions with their staff; another was completed anonymously by individual workers. The return rate for all of these surveys was in excess of 50 percent. The information from each survey was used to

evaluate the success in implementing ISMS. This dual survey approach might be applicable to other sites interested in comparing the perceptions of the safety systems by supervisors to that of staff.

Employee suggestion programs are similar to the survey approach. They ask, "What are the problems in your area and do you have suggestions for improvement?". The basic difference is, suggestion programs tend to be more passive and open ended than surveys. The success of both approaches is dependent on employees seeing results and, if possible, personally rewarded for participating in the improvement process.

Workplace Self Assessments are used at all sites responding to the request for information. These assessments are designed to gather information from all workplaces on all aspects of worker safety. These are formal assessments conducted by teams composed of peers both external and internal to the work unit, with support (if deemed necessary by management) from subject matter experts in ES& H and QA. Ideally, they are based on clear performance expectations using evaluation forms to ensure consistent data gathering. Formal reports are issued to management and the workforce. These assessments can influence worker attitudes and increase the level of safety in the workplace, much as a job observation program does, but only if the assessment program is based on expectations linked to performing work safely, measuring performance fairly and objectively, and presenting the findings in a manner that drives improvement. Several sites pointed out the need for rewarding self reporting and for providing incentives for those workers and supervisors who actively participate. The goal is to enhance the flow of information at the working level and to avoid shooting the messenger. Gathering information at this level of detail, with worker insight, is not readily available through other assessment approaches.

Line Management Overview Program is one site's term for frequent safety walk throughs by the manager of a work areas. This approach demonstrates line management's commitment to a safe workplace and provides visibility of management's leadership role in the assessment program. It reinforces the thought, "Because management takes assessment seriously, I should also take assessment seriously." This approach focuses on the same level as workplace assessments, but are less formal and much more frequent. Frequency is based on the policy that walk throughs occur with sufficient frequency for workers to view them as routine and not unusual events. Although many sites use the same evaluation forms as in those used in formal assessments, in this case the forms are used as prompts for observations and interviews.

Technical Assessments are used at all sites surveyed as a part of the overall assessment program. Technical assessments are in depth independent evaluations of the effectiveness of the traditional safety disciplines, e.g., industrial hygiene, industrial safety, health physics, waste management, emergency preparedness and fire prevention. Some sites use an integrated team of safety professionals selected on the basis of the work and hazards present. The team approach ensures the technical integrity of the assessment process and reduces work interruptions. The team is also effective in assessing the standards and

controls selected for safe work, and confirming that technical requirements are adhered to in conducting the work. The frequency of these assessments is often based on the level of hazards, the complexity of the operations, and the safety record of the facility, building, or working group. Assessments in high hazard facilities or sites are often annual; at other sites, once every three years. One site has attempted to time these evaluations so that they are congruent with vertical assessments of a department's or division's safety management program. In this way, an organizational unit receives a complete picture of their effectiveness at doing work safely, from the technical basis to safety program management. This comprehensive portrayal provides a firm basis for evaluating and improving a group's self assessment, including line management overview and individual behavior and attitudes.

Safety Management Assessments are evaluations that address the adequacy of safety management from the workplace to senior levels of line management. As such, senior management is involved in the planning and conduct of these assessments. One site establishes teams of peers and subject matter experts to evaluate a division's or department's safety management. Some sites rely on external peer reviews to gather information on how effectively the safety program is managed. In all cases, the scope of these evaluations includes a program to track compliance with safety training requirements, evidence of management's commitment, a safety structure for disseminating information and implementing improvements at the working level, and a lessons learned and self assessment program. The organizational structure is evaluated for evidence that safety is integrated into the workplace and for clearly defined roles and responsibilities. These assessments have greater value and impact on the organization if the results are integrated with information from technical assessments and workplace self assessments.

Contract Performance Assessment. Sites with performance based contracts are required to prepare a formal annual report to DOE on how well their performance met the expectations in the contract. Expectations include the usual performance indicators: injury and illness data, chemical exposures over consensus thresholds, radiation worker exposure data, radiation dose to the public and environment, waste management and minimization data, environmental release data, and frequency of occurrence reports. Also included in some cases are process measures designed to evaluate how well a site is meeting the seven principles of ISMS. These data and the analytical information in the annual report are verified and validated by an assessment conducted by site staff independent of programmatic activity and of the ES&H organization. The resulting report provides DOE a basis for evaluating the site's program. The report is also useful as input to DOE for designing its annual appraisal and to develop its operational awareness activities.

Operational Awareness is the mechanism used by DOE to discharge its line management responsibilities. At many sites, the Facility Representative Program performs this function. At other operational awareness is distinct from facility representatives program. Although information may be gathered by Facility Representatives, line management remains accountable for operational awareness. The amount of site/DOE interaction varies, but

DOE staff observe and, in some situations participate, in contractor ES&H activities on site. Activities might include participating as observers during contractor technical assessments , actively participating in establishing contract performance measures and their validation, and in conducting safety and readiness reviews. DOE Line ES&H Oversight Policy (DOE P 450.5) and Quality Assurance Order 5700.6C, requires vigorous DOE operational awareness of its contractors activities, in conjunction with a robust contractor assessment program. Both directives recognize that credible and rigorous contractor assessment programs can reduce the extent and frequency formal DOE assessments

DOE Annual Appraisals are conducted to assure DOE line management that work is being conducted safely by contractors and, if it is not, that appropriate corrective improvements have been instituted. In the past, the scope of these assessments was often based on rote compliance, with little regard for whether being fully compliant improved safety practices and reduced hazards. More recently, the scope of these assessments has been based on the principles and core functions of ISMS, which are more likely to result in improved safety. There are clear expectations, often based on contract performance measures, that focus on programs and systems rather than individual findings, and an evaluation of the current status of programs in which internal or external assessment demonstrated evidence of a pattern of unsafe practices.

A compilation of the information from each site responding to the survey is provided in Attachment A. At the time of this report, May 1998, the points of contact for more details on the assessment programs at sites contributing to the SPAT-15 report are listed in Attachment B, “Directory for SPAT-15”.

GLOSSARY

Assessment. An evaluation of whether work conducted within DOE and contractor organizations is being performed safely and in a manner that provides protection for workers, the public, and the environment. Hence, the informational basis for an assessment might come from any one or a combination of the following sources: reports from internal assessments, including line management walk throughs; operational awareness; performance measures; formal assessments; or independent and external oversight. Assessment by an organization distinct from the one being evaluated, but within the same corporate structure (DOE and contractor, in this case), is defined as an objective assessment. Assessment by a regulatory entity, either internal (EH 2, EH 10) to DOE or external (e.g., EPA), is referred to as independent. These appraisals are distinguished by the fact that there is a potential for enforcement action.

Appraisal is often used as a synonym for assessment. In this report, the use of appraisal, has been eschewed in favor of assessment.

Integration, an integrated assessment process refers to evaluations that are intimately integrated into the work, management, and reporting activities of the organization being evaluated. An integrated assessment coordinates assessment activities of all parties with assessment responsibilities so that the disruption of work is minimized, a more complete and comprehensive portrayal of the safety program is achieved, and the input from any one assessor is enhanced by interaction with evaluators from other functional disciplines.

Line Manager. Any one in an organization with the responsibility and authority to allocate resources, in the context of this report, for safety improvements.

Safety refers to safety in its broadest sense: protection of the worker, the public, and the environment.